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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/677,558	09/29/2000	Gi-Young Jeun	29347/990488	1618

7590

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Marshall O'Toole Gerstein
Murray & Borun
6300 Sears Tower
233 South Wacker Drive
Chicago, IL 60606-6402

EXAMINER

NGUYEN, DILINH P

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 04/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/677,558

Applicant(s)

JEUN ET AL.

Examiner

DiLinh Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 8-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the heat sink is adhered to at least one of the lead frame and the sealer with an adhesive; and the heat sink and the sealer are connected to each other by means of the grooves or the rings must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase: "the heat sink and the sealer each have grooves or rings and wherein the heat sink and the sealer are connected to each other by means of the grooves or the rings" is not understood.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 8-9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Majumdar et al. (U.S. Pat. 5703399) and Drake et al. (U.S. Pat. 6281574) in view of Ishigami (U.S. Pat. 5057906).

Majumdar et al. disclose a semiconductor power module (Fig. 9, column 11, lines 19-48), comprising:

a lead frame 3 having a first portion at a first level, a second portion surrounding the first portion at a second level, and a plurality of terminals 15 and 17 connected to the second portion;

a power circuit 9 mounted on a first surface of the first portion;

a heat sink 1; and

an insulating resin 7 having an electrically insulating property that covers the power circuit (column 8, lines 49-57). However, Majumdar et al. fail to disclose the heat sink is an insulator having an electrically insulating property and thermal conductivity.

Drake et al. disclose a semiconductor device (fig. 2, column 1, lines 17-19) comprising: a thermally conductive, electrically insulating heat sink 12 to provide a high efficiency and be of low cost for the semiconductor device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made

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to modify the device of Majumdar et al. to provide a high efficiency and be of low cost for the semiconductor device, as shown by Drake et al.

However, Majumdar et al. and Drake et al. fail to disclose the heat sink contacts the second surface opposite the first surface of the lead frame.

Ishigami discloses a semiconductor device (fig. 1, column 3, lines 5 et seq.) comprising: a heat sink 11 contacts a second surface surface opposite a first surface of the lead frame 15 to increase the heat dissipation for the device package. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Majumdar et al. and Drake et al. to increase the heat dissipation for the device package.

- Regarding claim 2, Majumdar et al. disclose the first portion of the lead frame is centrally positioned within the lead frame.
- Regarding claim 3, Majumdar et al. disclose the power circuit 9 includes a power semiconductor element 4a.
- Regarding claim 4, Majumdar et al. disclose the first surface of the first portion is a top surface and wherein the second surface of the first portion is a bottom surface.
- Regarding claim 5, Majumdar et al. disclose a control circuit 8 that drives the power circuit.
- Regarding claim 8, Ishigami discloses the heat sink is adhered to at least one of the lead frame and a sealer 24 with an adhesive 19 (fig. 1, column 3, line 18).
- Regarding claims 8-9, Majumdar et al. disclose the heat sink 1 is adhered

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to at least on the lead frame 3 and the insulating resin 7 with a highly heat conducting resin 2, wherein the adhesive contains a filler that includes at least one compound selected from the group consisting of AlN (column 8, lines 22-34).

- Regarding claim 11, Drake et al. disclose the heat sink 12 comprises at least one compound selected from the group consisting of BeO (fig. 1B).

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Majumdar et al. (U.S. Pat. 5703399) and Drake et al. (U.S. Pat. 6281574) in view of Ishigami (U.S. Pat. 5057906) and further in view of McCarthy et al. (U.S. Pat. 3956726).

Majumdar et al. fail to disclose the module further comprising a heat detection circuit. McCarthy et al. disclose a device comprising a heat detection circuit (column 1, lines 39-42) to detect over heating for the device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Majumdar et al., Drake et al. and Ishigami to provide a heat detection circuit to detect over heating for the device, as shown by McCarthy et al.

4. Claim 10, in so far as it is understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Majumdar et al. (U.S. Pat. 5703399) and Drake et al. (U.S. Pat. 6281574) in view of Ishigami (U.S. Pat. 5057906) and further in view of Park et al. (U.S. Pat. 6239487).

Majumdar et al., Drake et al. and Ishigami fail to disclose the heat sink and the sealer are connected to each other by means of the grooves or the rings.

Park et al. disclose a semiconductor device comprising: a heat sink 3b and a sealer 10 each have grooves or recesses 3-3 and wherein the heat sink and the sealer

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are connected to each other by means of the grooves or recesses (fig. 4B, column 4, lines 15-20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Majumdar et al., Drake et al. and Ishigami to increase the contact area with the sealer and also to increase a heat dissipation capability of the package, as shown by Park et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (703) 305-6983. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DLN
April 3, 2003


LONG PHAM
PRIMARY EXAMINER